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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,257	12/07/2004	Sajad Haq	540-537	2847

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EXAMINER
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VETERE, ROBERT A

ART UNIT	PAPER NUMBER
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1792

MAIL DATE	DELIVERY MODE
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12/29/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/517,257	<b>Applicant(s)</b> HAQ ET AL.	
	<b>Examiner</b> ROBERT VETERE	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-21 and 24-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 24-27 is/are allowed.
- 6) ☒ Claim(s) 1,4,6,8-13 and 15-20 is/are rejected.
- 7) ☒ Claim(s) 2,3,5,14 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Examiner's Comments*

An amendment, amending claims 1, 5 and 6, cancelling claim 7 and adding new claims 24-27, was received and entered on 10/22/2009.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, 12-13 and 15-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Setlur et al. (Appl. Phys. Lett., 69(3), p. 345).

**Claims 1, 4, 7 and 17-18:** Setlur teaches a method of forming nanowires (Abst.) comprising the steps of: providing clusters (claimed agglomerated mass) of copper nanoparticles, providing a gaseous fluid of polycyclic aromatic hydrocarbons (PAH) molecules, depositing the PAH molecules onto the surface of the copper particles and assembling the copper particles to produce a linear nanowire (p. 346, right column through p. 347, left column; Fig. 3).

**Claim 12:** Setlur also explains that the copper nanoparticles help catalyze the decomposition of the carbon source (p. 345, first column).

**Claim 13:** Setlur also teaches that the PAH molecules form a nanotube which surrounds the copper nanowire (p. 347, left column).

**Claims 15-16:** Setlur also teaches that the deposit of PAH molecules which form the nanotube are graphitic sheets (p. 346, right column; Fig. 2).

**Claim 19:** Setlur also teaches that a plurality of nanowires is formed (p. 347, left column; Fig. 3).

3. Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Kim (WO 03/008331).

**Claim 20:** Kim teaches a method of forming nanotubes comprising the steps of providing metal catalyst nanoparticles (p. 13:1-2; p. 11:16-20), providing a carbon source (p. 13:3-6), wherein the carbon

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source is gaseous (claimed fluid of molecules) and halogenated (p. 16:11-21), and forming carbon nanotubes via vapor deposition (p. 13:7; p. 17:6-9) (claimed depositing carbon on the catalyst particles and depositing more carbon to form nanotube deposits).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6 and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Setlur in light of Murakami et al. (US 4,983,244).

**Claims 6 and 8-11:** While Setlur teaches that the carbon molecules form a graphitic structure, it fails to teach that the carbon molecules are produced by decomposing a polymer. Murakami, however, teaches that polymers can be decomposed to form a graphitic precursor (11:19-23). Murakami also teaches that this decomposition forms a gas (7:7-20) and that the decomposition can be performed at temperatures from 400-600°C (11:51-56; 400°C is approximately 375°C). The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the decomposition product of a polymer as the precursor fluid for the formation of graphite in the method of Setlur with the predictable expectation of success.

***Allowable Subject Matter***

6. Claims 24-27 are allowed.

7. Claims 2-3, 5, 14, and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Regarding claims 2-3 and 24-25, neither Setlur nor Oku fairly teach or suggest that the nanoparticles which form the nanowire are ferromagnetic materials. With respect to claims 5 and 26, Kim teaches that a fluorocarbon is used as the carbon source. However, there is no fair suggestion in Kim that the carbon sources taught in the Kim method could be used in either the method of Setlur or Oku. Regarding claim 21, Kim also fails to teach that the halogenated molecule source comprises a decomposed polymer.

With respect to claim 14, Harutyunyan et al. (US 7,014,737) teaches that nanotubes and nanofibers can be annealed to purify the nanotubes or nanowires by removing residual catalyst molecules (9:61-64). However, nothing in Setlur, Oku or Harutyunyan fairly teaches or suggests that the catalyst particles comprise carbon and that carbon is the impurity being removed by the annealing process.

Finally, Nolan et al. (US 5,780,101) teaches a method of forming carbon coated ferromagnetic nanoparticles (Abst., 2:54-57) wherein a carbon nanotube structure is grown from the carbon coated particles (Fig. 4, 2:45-53). However, with respect to claim 1, Nolan fails to teach that the ferromagnetic particles assemble to form a nanowire. Therefore, there is no reasonable suggestion or motivation to combine the teachings of Nolan with Setlur or Oku to arrive at a method which renders claim 1 obvious.

Oku et al. (Microelectronic Engr., 51-52, pp. 61-60) teaches a method of forming nanowires comprising the steps of: providing gold nanoparticles, providing a fluid of alpha-terpineol molecules in solution (p. 52) so that the terpeneol molecules form graphite layers around the nanoparticles (Fig. 5), and assembling the nanoparticles to form a gold nanowire (Fig. 5). Oku also teaches that the nanowires are linear (Fig. 5). However, Oku teaches the use of a liquid rather than a vapor and does not fairly teach or suggest that such a method could be combined with Setlur.

### ***Response to Arguments***

8. Applicant's arguments filed 10/22/2009 have been fully considered but they are not persuasive.

Applicant argues that Setlur does not teach any of the limitations of claim 1 on p. 345 and asks the examiner to point out where these limitations are taught. This is not persuasive. As stated above, these limitations are taught on pp. 346-347 and in Fig. 3. Specifically, Setlur shows providing nanoparticles in, e.g., Fig. 3, and describes the process by which the reaction occurs in the second

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column of p. 346 through the first column of p. 347. For example, Setlur states that the hydrogen arc produces PAH molecules and copper molecules (claimed vapor of molecules) and that the growth proceeds by the addition of atoms, chains and rings.

Applicant also argues that the examiner has not articulated a reason for combining Setlur and Murakami because the examiner has merely provided a conclusory statement. This is not persuasive. The reasoning has been articulated based on the ruling in *Sinclair* that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination and the fact that Murakami teaches that decomposition of a polymer is a suitable means of generating graphitic precursors.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT VETERE whose telephone number is (571)270-1864. The examiner can normally be reached on Mon-Fri 9-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Robert Vetere/  
Examiner, Art Unit 1792

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792